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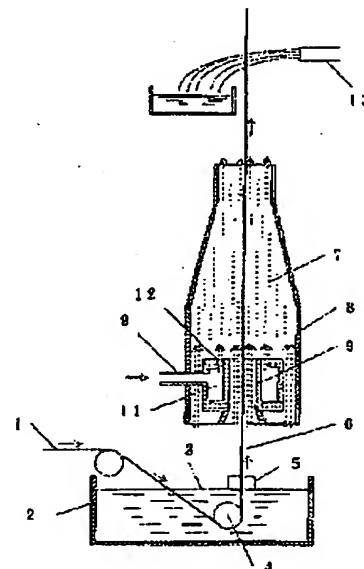
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(54) 【発明の名称】 溶融亜鉛・アルミニウム合金めっき線の冷却装置

(57) 【要約】

【課題】 溶融亜鉛・アルミニウム合金めっき浴でめっきした金属線を垂直に引き上げつつ冷却する方法で、めっき表面の凹凸および偏肉の発生がない高品質のめっき線を製造する。

【解決する手段】 外筒と内筒の間に圧縮空気を噴き出させるノズルを配置し、そのノズルに圧縮空気を供給し、その圧縮空気の噴流で、ノズル内筒内および外筒とノズルの隙間から周りの大気を金属線の軸線にたいし並行に、および金属線の全周に、かつ金属線の進む方向と同じ方向に吸引することにより、金属線のめっき表面の全周を連続的に均一凝固させる冷却装置で、その後水冷却をする。



(2)

特開2000-45056

1

【特許請求の範囲】

【請求項1】 溶融亜鉛・アルミニウム合金めっき浴でめっきした金属線を垂直に引き上げつつ冷却する方法で、供給する圧縮空気とその圧縮空気の噴流で吸引される周りの大気を、金属線の軸線と並行に、および金属線の全周に、かつ金属線の進む方向と同じ方向に流す冷却装置。

【請求項2】 外筒と内筒間の同心軸上に圧縮空気を噴き出させるノズルを配置し、内筒内側にめっきした金属線を通かせる請求項1記載の冷却装置。

【請求項3】 供給する圧縮空気を低温にするために圧縮空気冷却装置を経由させるか、または他の低温ガスを挿入することを加えた請求項1及び請求項2記載の冷却装置。

【請求項4】 吸引される周りの大気を低温にするために、外気を引き込むか、または他の低温ガスを引き込み吸引することを加えた請求項1、請求項2及び請求項3記載の冷却装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は溶融亜鉛・アルミニウム合金めっきを施した金属線の冷却装置に関する。

【0002】

【従来の技術】従来、めっき浴から引き上げられた後の金属線の冷却は、大気放冷後水冷却をするのが一般的であるが、実公昭57・13880号公報にはタンク内で液体を巡回させ二次冷却し、そのタンク内の上部でノズルから圧縮空気を鋼線と直角方向から吹き付けて二次冷却する方法が示されている。また、特公平4・183844公報には気体ないしミストを鋼線に10〜40°角度で、吹き付け圧力が1〜4kg/cm<sup>2</sup>で冷却する方法が示されている。また、特開平6・81107公報には冷却液を冷却容器に循環供給して、冷却容器内に線材を通過させ冷却する方法が示されている。

【0003】

【発明が解決しようとする課題】溶融亜鉛・アルミニウム合金めっきを施した、めっき付着量が300g/m<sup>2</sup>以上の厚めっき金属線では、従来の一般的な大気放冷後水冷却をする方法は、大気放冷のみでめっき表層が凝固するには長時間となるため、水冷却までに長い距離が必要で水冷却装置の配置が困難である。

【0004】よって、大気放冷ではなく前述の実公昭57・13880号公報、特公平4・183844公報および特開平6・81107公報などの強制的に冷却する方法が採られるが、めっき付着量が300g/m<sup>2</sup>以上の厚めっきの場合はめっき浴から引き上げ後にめっき表層が凝固しないうちに水冷却または水滴冷却すると、水の持つ力がめっき表層に作用し凹凸模様が発生し易く、冷却条件の調整が非常に難しい作業となる。

【0005】また、圧縮空気等で噴く付け冷却する場合

2

も一から二方向ノズルからの冷却では、凝固始めのめっきがノズル方向以外の方向に寄せられ偏肉が発生し、噴く付けの角度が金属線の軸線に対して大きくなるとめっき表層が凹凸模様が発生し易い。

【0006】本発明は前記のような課題を解決するために創案されたもので、その目的とするところは、めっき厚が300g/m<sup>2</sup>以上と厚く、かつそのめっき表層に凹凸模様がなく、均一で偏肉の少ない溶融亜鉛・アルミニウム合金めっき金属線の冷却装置を提供するものである。

【0007】

【課題を解決するための手段】上記目的を達成するために、本発明の冷却装置においては、めっき浴から引き上げられた金属線の軸線にたいし圧縮空気を並行に、および円筒状のノズルから金属線の全周に、かつ金属線の進む方向と同じ方向に噴き出させる。

【0008】その噴き出た圧縮空気の勢いでノズルの内筒内側および外筒とノズルの隙間から、周りの大気を金属線の軸線にたいし並行に、および金属線の全周に、かつ金属線の進む方向と同じ方向に吸引することにより、金属線のめっき表層の全周を連続的に均一凝固させる冷却装置で、この装置の通過後始めて水冷する。

【0009】

【発明の実施の形態】発明の形態を実施例にもとづき図面を参照して説明する。図1において、溶融亜鉛めっきされた金属線1は、溶融亜鉛・アルミニウム合金めっき槽2に溶融された溶融亜鉛・アルミニウム合金浴3の中を通し、シンクローラ4で垂直方向に金属線を引き上げ、絞り装置5で溶融亜鉛・アルミニウム合金がめっきされ、溶融亜鉛・アルミニウム合金のめっきを施された金属線6は、本発明の冷却装置7を経由した後水冷13で冷却される。

【0010】本発明の冷却装置7は、外筒8の内部に圧縮空気を噴き出させるノズル12を外筒8と同心軸上に配置し、外筒8とノズル12の間には外気が吸引されるような隙間を設ける。

【0011】また、ノズル12の内側は金属線6が通せるような内筒9を配置し、外気も吸引される間となっている。

【0012】ノズル12には圧縮空気供給管10から供給された圧縮空気を、圧縮空気溜まり11に溜まった後、金属線6の軸線にたいし並行に、かつ金属線6の進む同じ方向に噴き出すように設けられたノズル12から金属線6の全周に噴き出させるよう円筒スリットから噴流させる。

【0013】また、円筒スリットではなく複数の小穴を円周上に配置し、金属線6の軸線にたいし並行に、かつ金属線6の進む同じ方向に噴き出させることで円筒スリットから噴流させるのと同様の効果が得られる。

【0014】この圧縮空気の噴流により冷却装置7の上流入側から、大気が金属線6の進む同じ方向に吸引され

(3)

特開2000-45056

3

4

る。

【0015】供給圧縮空気が常温では、外筒8が長くなり冷却装置7が配置できない場合は、供給する圧縮空気をあらかじめ圧縮空気冷却装置を配置し、低温の圧縮空気を供給するか、または他の低温ガスを供給することで冷却能力をあげ、冷却装置7の配置を可能にする。

【0016】また、冷却装置7の上流入側から吸引される周りの大気は、溶融亜鉛・アルミニウム合金浴3に近いので常温より高い傾向にあり、上述と同様に冷却能力をあげるために、常温の外気を冷却装置7の上流入側に引き込むか、または他の低温ガスを引き込み吸引させて冷却能力をあげることができる。

【0017】当然のことながら冷却装置7内を流れる圧縮空気および吸引大気の流れは、溶融亜鉛・アルミニウム合金浴3から引き上げられる金属線6の速度より速くなるよう供給圧縮空気の量、圧力およびノズルのスリットの隙等を調整する。

【0018】

【発明の効果】本発明は、以上説明したように構成されているので、以下に記載されるような効果を奏する。

【0019】ノズルから圧縮空気を金属線の軸線にたいし並行に、および金属線の全面に、かつ金属線の進む方向と同じ方向に吹き出すと同時に、その吹き出し方でノズル

\*ズル内筒内側および外筒とノズルの隙間から、周りの大気を金属線の軸線にたいし並行に、および金属線の全面に、かつ金属線の進む方向と同じ方向に吸引することにより、金属線のめっき表層の全面を連続的に均一凝固させることが出来る。これにより、めっき表層の凹凸および腐食の発生を防げれる効果がある。

【0020】

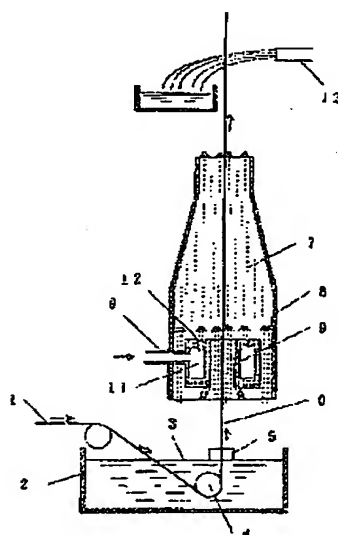
【図面の簡単な説明】

【図1】実施例を示す説明図である。

【符号の説明】

- 1 金属線
- 2 溶融亜鉛・アルミニウム合金めっき槽
- 3 溶融亜鉛・アルミニウム合金めっき浴
- 4 シンクロール
- 5 絞り装置
- 6 金属線（溶融亜鉛・アルミニウム合金めっき線）
- 7 冷却装置
- 8 外筒
- 9 内筒
- 10 圧縮空気供給管
- 11 圧縮空気溜まり
- 12 ノズル
- 13 水冷却

【図1】



(4)

特開2000-45056

フロントページの続き

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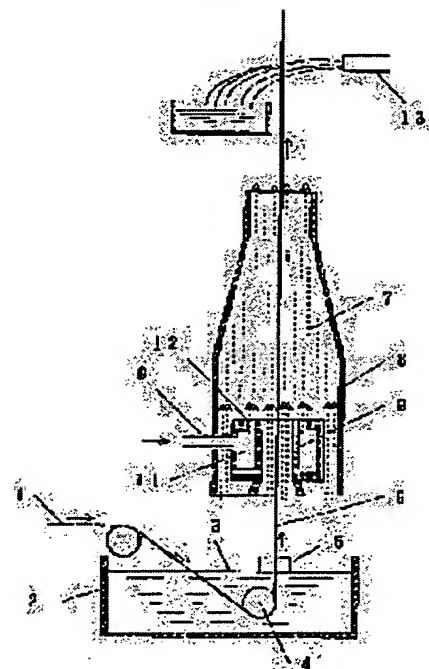
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## (54) COOLING DEVICE FOR HOT DIP ZINC-ALUMINUM ALLOY PLATED WIRE

## (57)Abstract:

**PROBLEM TO BE SOLVED:** To produce a plated wire of high quality free from the generation of the ruggedness of a plating surface layer and unevenness in thickness in a method for cooling metallic wire plated in a hot dip zinc-aluminum alloy plating bath while being vertically taken up.

**SOLUTION:** In this cooling device, a nozzle 12 jetting compressed air is arranged in the space between an outer cylinder 8 and an inner cylinder 9, and to the nozzle 12 compressed air is supplied, and, by the jet flow of the compressed air, the surrounding air is sucked from the inside of the inner cylinder 9 of the nozzle 12 and from the clearance between the outer cylinder 8 and the nozzle 12 parallel to the axis line of metallic wire 6, also all around the periphery and in the direction the same as the direction to which the metallic wire 6 progresses, thereby, the all periphery of the plating surface layer of the metallic wire 6 is continuously and uniformly solidified, and, after that, water cooling is executed.



## LEGAL STATUS

[Date of request for examination]

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CLAIMS

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[Claim(s)]

[Claim 1] the atmospheric air of the surroundings attracted by the jet of the compressed air supplied by the approach of cooling pulling up vertically the metal wire galvanized by melting zinc and the aluminum alloy plating bath, and its compressed air — \*\*\*\* of a metal wire, and concurrency and the perimeter of a metal wire — and the cooling system poured in the same direction as the direction to which a metal wire goes.

[Claim 2] the metal wire which has arranged the nozzle which makes the compressed air blow off on this shaft between an outer case and a container liner, and was galvanized to the container liner inside — a connoisseur — the cooling system according to claim 1 which carries out material.

[Claim 3] Claim 1 which added making it go via a compressed-air cooling system, or inserting other low temperature gas in order to make the compressed air to supply into low temperature, and a cooling system according to claim 2.

[Claim 4] Claim 1 which added drawing the open air, or drawing and attracting other low temperature gas in order to make the atmospheric air of the surroundings attracted into low temperature, claim 2, and a cooling system according to claim 3.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the cooling system of the metal wire which performed melting zinc and aluminum alloy plating.

[0002]

[Description of the Prior Art] Although it is common to carry out water cooling after atmospheric-air radiationnal cooling as for cooling of the metal wire after being able to pull up from a plating bath conventionally, it revolves JP,57-13880,Y in a liquid within a tank, and carries out the primary cooling of concrete, and the approach of spraying the compressed air steel wire and from a right angle, and carrying out the secondary cooling of concrete is shown from the nozzle by the upper part in the tank. Moreover, the approach a blasting pressure cools a gas thru/or Myst by 1 - 4 kg/cm<sup>2</sup> at 10-40-degree include angle to steel wire is shown in the JP,4-183844,B official report. Moreover, circulation supply of the coolant is carried out in a JP,6-81107,A official report at a cooling container, and the approach of making pass a wire rod and cooling in a cooling container, is shown.

[0003]

[Problem(s) to be Solved by the Invention] The plating coating weight which performed melting zinc and aluminum alloy plating is 300 g/m<sup>2</sup>. Since the approach of carrying out the conventional general water cooling after atmospheric-air radiationnal cooling in the above thick plating metal wire serves as long duration for a plating surface's solidifying only by atmospheric-air radiationnal cooling, a distance long by water cooling is required for it, and arrangement of water cooling equipment is difficult for it.

[0004] Therefore, although the approach of cooling compulsorily [ not atmospheric air radiationnal cooling but above-mentioned JP,57-13880,Y, a JP,4-183844,B official report, a JP,6-81107,A official report, etc. ] is taken, plating coating weight is 300 g/m<sup>2</sup>. When it is the above thick plating, before a plating surface solidifies after raising from a plating bath, if waterdrop cooling is carried out, water cooling or the force which water has will act on a plating surface, and it will be easy to generate a concavo-convex pattern, and will become with operation with very difficult adjustment of cooling conditions.

[0005] Moreover, also when [ spurt out by the compressed air etc. ] attaching and cooling, in cooling from the 1 to 2 direction nozzle, the first plating of coagulation is brought near in the direction of [ other than the direction of a nozzle ], thickness deviation occurs, and if the include angle which attaching sends out becomes large to \*\*\*\* of a metal wire, a plating surface will tend to generate a concavo-convex pattern.

[0006] Plating thickness is as thick as two or more 300 g/m, and there is no concavo-convex pattern in the plating surface, and the place which it was originated in order that this invention might solve the above technical problems, and is made into the object is uniform, and offers the cooling system of a melting zinc and an aluminum alloy plating metal wire with little thickness deviation.

[0007]

[Means for Solving the Problem] the axis of the metal wire which was able to be pulled up from



the plating bath in the cooling system of this invention in order to attain the above-mentioned object -- receiving -- the compressed air -- concurrency and the perimeter of a cylinder-like nozzle to a metal wire -- and it is made to blow off in the same direction as the direction to which a metal wire goes

[0008] the vigor of that compressed air that spouted and came out -- the atmospheric air of the container liner inside of a nozzle, and the clearance between an outer case and a nozzle to the surroundings -- the axis of a metal wire -- receiving -- concurrency and the perimeter of a metal wire -- and by drawing in in the same direction as the direction to which a metal wire goes, with the cooling system which carries out homogeneity coagulation continuously, the perimeter of the plating surface of a metal wire is begun after passage of this equipment, and carries out water cooling.

[0009]

[Embodiment of the Invention] The gestalt of invention is explained with reference to a drawing based on an example. In drawing 1, after the metal wire 6 by which the metal wire was perpendicularly pulled up with through and the sink roll 4, melting zinc and an aluminum alloy were galvanized with the collimator 5 in the inside of the melting zinc and the aluminium alloy bath 3 by which melting of the metal wire 1 by which hot dip zincing was carried out was carried out to melting zinc and the aluminium alloy plating tub 2, and melting zinc and aluminium alloy were galvanized goes via the cooling system 7 of this invention, it is cooled by water cooling 13.

[0010] The cooling system 7 of this invention arranges the nozzle 12 which makes the interior of an outer case 8 spout the compressed air on an outer case 8 and this shaft, and between an outer case 8 and a nozzle 12, it prepares a clearance so that the open air may be attracted.

[0011] Moreover, the inside of a nozzle 12 arranges a container liner 9 so that it can let a metal wire 6 pass, and it serves as a cylinder by which the open air is also attracted.

[0012] After the hydropneumatic accumulator ball 11 is covered, the jet of the compressed air supplied from the compressed-air supply pipe 10 is carried out to a nozzle 12 from a cylinder slit in parallel to the axis of a metal wire 6 so that the perimeter of a metal wire 6 may be gushed from the nozzle 12 prepared in \*\* which blows off in the same direction to which a metal wire 6 goes.

[0013] Moreover, not a cylinder slit but two or more pinholes are arranged on a periphery, and the function same with carrying out a jet is obtained from a cylinder slit in parallel to the axis of a metal wire 6 by making it blow off in the same direction to which a metal wire 6 goes.

[0014] It is drawn in by the jet of this compressed air in the same direction to which a metal wire 6 goes [ the upper close side of a cooling system 7 to atmospheric air ].

[0015] In ordinary temperature, when an outer case 8 becomes long and the supply compressed air cannot arrange a cooling system 7, it arranges a compressed-air cooling system for the compressed air to supply beforehand, raises refrigeration capacity with supplying the low-temperature compressed air or supplying other low temperature gas, and enables arrangement of a cooling system 7.

[0016] Moreover, in order to be in an inclination higher than ordinary temperature since it is close to melting zinc and the aluminium alloy bath 3, and to achieve refrigeration capacity like \*\*\*\*, the atmospheric air of the surroundings attracted from the upper close side of a cooling system 7 can draw the open air of ordinary temperature in the upper close side of a cooling system 7, or can make other low temperature gas able to draw and attract, and can achieve refrigeration capacity.

[0017] The rate of the compressed air which flows the inside of a cooling system 7 with a natural thing, and attraction atmospheric air adjusts the spare time of the slit of the amount of the supply compressed air, a pressure, and a nozzle etc. so that it may become quicker than the rate of the metal wire 6 which can be pulled up from melting zinc and the aluminium alloy bath 3.

[0018]

[Effect of the Invention] Since this invention is constituted as explained above, it does so effectiveness which is indicated below.

[0019] a nozzle to the compressed air -- the axis of a metal wire -- receiving -- concurrency and the perimeter of a metal wire -- and -- at the same time it blows off in the same direction

as the direction to which a metal wire goes -- the -- blowing off -- the -- the -- the  
atmospheric air of the clearance between the nozzle container liner inside and an outer case,  
and a nozzle to the surroundings -- the axis of a metal wire -- receiving -- concurrency and the  
perimeter of a metal wire -- and homogeneity coagulation of the perimeter of the plating surface  
of a metal wire can be continuously carried out by drawing in in the same direction as the  
direction to which a metal wire goes. Thereby, the irregularity of a plating surface and generating  
of thickness deviation can be prevented, and there is the \*\*\*\* effectiveness.

[0020]

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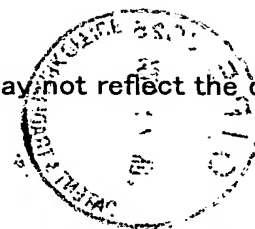
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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the explanatory view showing an example.

[Description of Notations]

1 Metal Wire

2 Melting Zinc and Aluminium Alloy Plating Tub

3 Melting Zinc and Aluminium Alloy Plating Bath

4 Sink Roll

5 Collimator

6 Metal Wire (Melting Zinc and Aluminium Alloy Plating Line)

7 Cooling System

8 Outer Case

9 Container Liner

10 Compressed-Air Supply Pipe

11 Hydropneumatic Accumulator Ball

12 Nozzle

13 Water Cooling

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[Translation done.]